

Amendments to the Claims:

Please cancel claims 73-94 and amend claims 71 and 72 as follows. Following is a complete listing of the claims pending in the application, as amended:

1. (Original) An apparatus for processing microelectronic workpieces, comprising:

a plurality of processing stations, all of the processing stations of the apparatus being manually accessible to a user to manually load microelectronic workpieces for processing;

an input/output station configured to support at least one microelectronic workpiece for automatic transfer to and from the processing stations; and

a transfer device positioned proximate to the input/output station and the processing stations, the transfer device being automatically movable to transfer microelectronic workpieces between the input/output station and the processing stations.

2. (Original) The apparatus of claim 1, further comprising a shield positioned at least proximate to the transfer device to at least restrict access by the user to the transfer device.

3. (Original) The apparatus of claim 1 wherein the processing stations are arranged along a generally straight first line and wherein the transfer device includes a robot configured to move along a second line generally parallel to the first line, and wherein the apparatus further comprises an enclosure disposed around at least one of the processing stations, the enclosure having a first access aperture through which the user can manually access all the process chambers, the enclosure having a second access aperture accessible to the robot and through which the robot can move microelectronic workpieces, with the second line being positioned between the first line and the first and second access apertures.

4. (Original) The apparatus of claim 1 wherein the transfer device is configured to carry and independently move two microelectronic workpieces.

5. (Original) The apparatus of claim 1 wherein the input/output station is configured to support a container carrying a plurality of microelectronic workpieces, with the container being accessible to the transfer device when the container is supported at the input/output station.

6. (Original) The apparatus of claim 1 wherein all the processing stations are aligned along a generally straight line.

7. (Original) The apparatus of claim 1 wherein the processing stations are aligned along a generally straight first line, and wherein the transfer device includes a robot configured to move along a second line generally parallel to the first line.

8. (Original) The apparatus of claim 1, further comprising an enclosure disposed around at least one of the processing stations, the enclosure having at least one opening positioned to allow manual access to all the processing stations of the apparatus.

9. (Original) The apparatus of claim 1, further comprising a shelf carried by the chassis and positioned to support a container of microelectronic workpieces while the user manually removes the microelectronic workpieces from the container and transfers the microelectronic workpieces to at least one of the processing stations.

10. (Original) The apparatus of claim 1 wherein the processing stations are arranged along a generally straight first line and wherein the transfer device includes a robot configured to move along a second line generally parallel to the first line, and wherein the apparatus further comprises an enclosure disposed around at least one of the processing stations, the enclosure having an access aperture through which the user can manually access all the processing stations.

11. (Original) The apparatus of claim 1 wherein the processing stations are arranged along a generally straight first line and wherein the transfer device includes a robot configured to move along a second line generally parallel to the first line, and

wherein the apparatus further comprises an enclosure disposed around at least some of the processing stations, the enclosure having an access aperture through which the user can manually access all the processing stations, the second line being positioned between the first line and the access aperture.

12. (Original) The apparatus of claim 1 wherein the processing station includes a support configured to carry the microelectronic workpiece, the support being moveable between a first transferring position and a second transferring position spaced apart from the first transferring position, wherein the support is oriented to receive the microelectronic workpiece from the transfer device when the support is in the first transferring position, and the support is oriented to receive the microelectronic workpiece manually from the user when the support is in the second transferring position, the support being configured to selectively stop its motion at the first and second transferring positions.

13. (Original) The apparatus of claim 1 wherein the transfer device includes:
a transfer device support having a guide path;
a base carried by the transfer device support and movable along the guide path;
a lift carried by the base and movable upwardly and downwardly along a lift axis;
an arm carried by the lift, the arm being rotatable relative to the base, the arm having an extension portion projecting away from the lift axis; and
first and second end effectors carried by the arm and rotatably coupled to the extension portion of the arm, with each end effector being independently rotatable relative to the arm and each end effector being configured to releasably carry a microelectronic workpiece.

14. (Original) The apparatus of claim 1 wherein all the processing stations of the apparatus are manually accessible from a single side of the apparatus.

15. (Original) An apparatus for processing microelectronic workpieces, comprising:
a plurality of processing stations;

an enclosure disposed proximate to at least one of the processing stations, the enclosure having an access aperture positioned to allow manual access to all the processing stations from a single side of the apparatus during operation;

an input/output station configured to support at least one microelectronic workpiece for automatic transfer to and from the processing stations; and a transfer device positioned proximate to the input/output station and the processing stations, the transfer device being automatically movable to transfer microelectronic workpieces between the input/output station and the processing stations.

16. (Original) The apparatus of claim 15, further comprising a shield positioned at least proximate to the transfer device to at least restrict access by the user to the transfer device.

17. (Original) The apparatus of claim 15 wherein the processing station includes:

a processing vessel configured to provide a processing fluid; and a support movably positioned proximate to the processing vessel and configured to carry the microelectronic workpiece, the support being moveable between a process position, a first transferring position spaced apart from the process position and a second transferring position spaced apart from the process position and the first transferring position, wherein the support is oriented to carry the microelectronic workpiece in contact with a processing fluid when the processing fluid is in the vessel and the support is in the process position, the support being oriented to receive the microelectronic workpiece from the transfer device when the support is in the first transferring position, and the support being positioned to receive the microelectronic workpiece manually from the user when the support is in the second transferring position, the support being configured to selectively stop its motion at the first and second transferring positions.

18. (Original) The apparatus of claim 15 wherein the transfer device is positioned between the access aperture and the plurality of processing stations.

19. (Original) An apparatus for processing microelectronic workpieces, comprising:

- a plurality of processing stations, all of the processing stations of the apparatus being manually accessible to a user to load microelectronic workpieces for processing;
- an input/output station configured to support a container of microelectronic workpieces for automatic transfer of the microelectronic workpieces to and from the processing stations;
- a transfer device positioned proximate to the input/output station and the processing stations, the transfer device being automatically movable to transfer microelectronic workpieces between the input/output station and the processing stations;
- an enclosure disposed around at least one of the processing stations, the enclosure having at least one access aperture through which the user can manually access all the processing stations of the apparatus; and
- a shield positioned at least proximate to the transfer device to at least restrict contact between the user and the transfer device when the user accesses at least one of the processing stations through the aperture.

20. (Original) The apparatus of claim 19 wherein the processing station includes:

- a processing vessel configured to provide a processing fluid; and
- a support movably positioned proximate to the processing vessel and configured to carry the microelectronic workpiece, the support being moveable between a process position, a first transferring position spaced apart from the process position and a second transferring position spaced apart from the process position and the first transferring position, wherein the support is oriented to carry the microelectronic workpiece in contact with a processing fluid when the processing fluid is in the vessel and the support

is in the process position, the support being oriented to receive the microelectronic workpiece from the transfer device when the support is in the first transferring position, and the support being positioned to receive the microelectronic workpiece manually from the user when the support is in the second transferring position, the support being configured to selectively stop its motion at the first and second transferring positions.

21. (Original) An apparatus for processing a microelectronic workpiece, comprising:

a processing station; and

a support movably positioned proximate to the processing station and configured to carry the microelectronic workpiece, the support being moveable between a first transferring position and a second transferring position spaced apart from the first transferring position, wherein the support is oriented to receive the microelectronic workpiece from an automatic transfer device when the support is in the first transferring position, and wherein the support is positioned to receive the microelectronic workpiece manually from a user when the support is in the second transferring position, the support being configured to selectively stop its motion at the first and second transferring positions.

22. (Original) The apparatus of claim 21 wherein the processing station includes a vessel configured to provide a processing fluid, and wherein the support is movable relative to the vessel to a process position, with the support oriented to carry the microelectronic workpiece in contact with a processing fluid when the processing fluid is in the vessel and the support is in the process position.

23. (Original) The apparatus of claim 21 wherein the support includes a carrier extending upwardly from the processing station, an elevator supported by the carrier and movable toward and away from the processing station, and a head carried by the elevator, the head having a receiving portion configured to releasably receive the

microelectronic workpiece, the head being rotatable relative to the carrier and the processing station.

24. (Original) The apparatus of claim 21 wherein the support is inaccessible to the automatic transfer device when the support is in the second transferring position.

25. (Original) The apparatus of claim 21, further comprising a shield positioned proximate to the processing station and the support, with the support positioned below at least a portion of the shield when the support is in the first transferring position, the support being positioned above at least a portion of the shield when the support is in the second transferring position.

26. (Original) The apparatus of claim 21, further comprising:
the automatic transfer device, wherein the automatic transfer device includes a robot configured to transfer a microelectronic workpiece to and from the support when the support is in the first transferring position; and
a shield positioned proximate to the automatic transfer device to at least restrict access to the automatic transfer device by the user while the user manually moves a microelectronic workpiece to and from the support.

27. (Original) The apparatus of claim 21 wherein the support includes at least one receiving surface configured to receive the microelectronic workpiece, and wherein the receiving surface is rotatable from a first orientation when the support is in the first and second transferring positions to a second orientation when the support is positioned to move the microelectronic workpiece into the processing station.

28. (Original) The apparatus of claim 21 wherein the support is movable toward and away from the processing station between the first and second transferring positions, the support being a first distance from the processing station when in the first transferring position, the support being a second distance from the processing station when in the second transferring position, the second distance being greater than the first distance.

29. (Original) The apparatus of claim 21 wherein the support is movable toward and away from the processing station between the first and second transferring positions, the support being a first distance above the processing station when in the first transferring position, the support being a second distance above the processing station when in the second transferring position, the second distance being greater than the first distance.

30. (Original) The apparatus of claim 21, further comprising an enclosure disposed around the processing station and the support.

31. (Original) The apparatus of claim 21 wherein the processing station is a first processing station and the support is a first support, and wherein the apparatus further comprises:

a second processing station positioned proximate to the first processing station;
and

a second support movably positioned proximate to the second processing station and configured to carry a microelectronic workpiece, the second support being moveable between a first transferring position and a second transferring position spaced apart from the first transferring position, wherein the second support is oriented to receive a microelectronic workpiece from the automatic transfer device when the second support is in the first transferring position, and wherein the second support is positioned to receive the microelectronic workpiece manually from a user when the second support is in the second transferring position, the second support being configured to selectively stop its motion at the first and second transferring positions.

32. (Original) An apparatus for processing a microelectronic workpiece, comprising:

a processing station;

a support positioned proximate to the processing station and configured to carry the microelectronic workpiece, the support being moveable between a first

transferring position and a second transferring position spaced apart from the first transferring position, wherein the support is positioned to receive the microelectronic workpiece from an automatic transfer device when the support is in the first transferring position, and wherein the support is positioned to receive the microelectronic workpiece manually from a user when the support is in the second transferring position, the support being configured to selectively stop its motion at the first and second transferring positions;

a transfer device movably positioned proximate to the support to automatically move the microelectronic workpiece to and from the support; and

a shield positioned at least proximate to the transfer device to at least restrict access by the user to the transfer device while the user manually contacts a microelectronic workpiece with the support.

33. (Original) The apparatus of claim 32 wherein the shield is at least partially light transmissive.

34. (Original) The apparatus of claim 32 wherein a portion of the shield extends over the transfer device, and wherein the support has a receiving portion configured to receive the microelectronic workpiece when the support carries the microelectronic workpiece, the receiving portion being positioned below the portion of the shield extending over the transfer device when the support is in the first transferring position, the receiving portion being positioned at or above the portion of the shield extending over the transfer device when the support is in the second transferring position.

35. (Original) An apparatus for processing a microelectronic workpiece, comprising:

at least one processing station configured to process a microelectronic workpiece;

a transfer device movably positioned proximate to the processing station and configured to automatically carry the microelectronic workpiece to and from the processing station;

an enclosure disposed around at least a portion of the processing station and at least a portion of the transfer device; and

a support surface positioned external to the enclosure at least proximate to the processing station, the support surface being sized and shaped to removably receive and carry a container of microelectronic workpieces while the microelectronic workpieces are manually removed from the container and placed within the enclosure.

36. (Original) The apparatus of claim 35 wherein the support surface is generally flat.

37. (Original) The apparatus of claim 35, further comprising a support movably positioned proximate to the processing station and configured to carry the microelectronic workpiece, the support being moveable between a first transferring position and a second transferring position spaced apart from the first transferring position, wherein the support is positioned to receive the microelectronic workpiece from the transfer device when the support is in the first transferring position, and wherein the support is positioned to receive the microelectronic workpiece manually from a user when the support is in the second transferring position, the support being configured to selectively stop its motion at the first and second receiving positions.

38. (Original) An apparatus for processing a microelectronic workpiece, comprising:

a processing station configured to removably receive the microelectronic workpiece;

a support positioned at least proximate to the processing station, the support being configured to releasably carry the microelectronic workpiece, the support being movable relative to the processing station between a transferring position with the support oriented to releasably receive the

microelectronic workpiece and a processing position with the support oriented to carry the microelectronic workpiece in the processing station, wherein the support is supported relative to the processing station from a position above the processing station.

39. (Original) The apparatus of claim 38 wherein the processing station includes a vessel configured to provide a processing fluid and wherein the support is oriented to contact the microelectronic workpiece with the processing fluid when the support is in the processing position.

40. (Original) The apparatus of claim 38 wherein the support includes a carrier extending upwardly from the processing vessel, an elevator supported by the carrier and movable toward and away from the processing station, and a head carried by the elevator, the head having a receiving portion configured to releasably receive the microelectronic workpiece.

41. (Original) The apparatus of claim 38 wherein the support includes a carrier extending upwardly from the processing station, an elevator supported by the carrier and movable toward and away from the processing station, and a head carried by the elevator, the head having a receiving portion configured to releasably receive the microelectronic workpiece, the head being rotatable relative to the carrier and the processing vessel between the transferring position and the processing position.

42. (Original) The apparatus of claim 38 wherein the transferring position is a first transferring position and wherein the apparatus further comprises a transfer device configured to automatically transfer the microelectronic workpiece to the support when the support is in the first transferring position, further wherein the support is movable to a second transferring position with the support oriented to receive a microelectronic workpiece manually from a user when the support is in the second transferring position, and wherein the support is configured to selectively stop its motion at the first and second transferring positions.

43. (Original) The apparatus of claim 38 wherein the support includes a carrier extending upwardly from the processing station, the carrier having an elevator supported by the carrier and movable toward and away from the processing station, and a head carried by the elevator, the head having a receiving portion configured to releasably receive the microelectronic workpiece, and wherein the carrier is carried by a guide device positioned above the processing station, the guide device having a guide path, the carrier being movable toward and away from the processing station along the guide path.

44. (Original) The apparatus of claim 38, further comprising a track positioned above the processing station, wherein the support is at least partially suspended from the track and is movable along the track toward and away from the processing station.

45. (Original) The apparatus of claim 38, further comprising:
a track positioned above the processing station, wherein the support is at least partially suspended from the track and is movable along the track toward and away from the processing station; and
a releasable locking mechanism engagable with the support to at least restrict motion of the support along the track.

46. (Original) An apparatus for processing a microelectronic workpiece, comprising:

a processing station configured to removably receive the microelectronic workpiece; and
a support positioned at least proximate to the processing station, the support being configured to releasably carry the microelectronic workpiece, the support being movable relative to the processing station along a first guide path between a transferring position and a processing position, with the support oriented to releasably receive the microelectronic workpiece when the support is in the transferring position, and with the support oriented to carry the microelectronic workpiece in the processing station when the support is in the processing position, wherein the support is carried by a

support holder having a second guide path, with the support being movable toward and away from the processing station along the second guide path, the second guide path being oriented transverse to the first guide path.

47. (Original) The apparatus of claim 46 wherein the support holder includes a track positioned above the processing station, and wherein the support is at least partially suspended from the track and is movable along the track toward and away from the processing station.

48. (Original) The apparatus of claim 46 wherein the support holder includes a track having a channel positioned above the processing station, wherein the support is suspended from the track by a guide member received in the channel, the support being movable along the track toward and away from the processing station.

49. (Original) The apparatus of claim 46 wherein the support holder includes a track positioned above the processing station with the support being at least partially suspended from the track and movable along the track toward and away from the processing station, and wherein the apparatus further comprises a releasable locking mechanism engagable with the support to at least restrict motion of the support along the track when the support is in a selected position.

50. (Original) The apparatus of claim 46, further comprising a transfer device being movable relative to the processing station along a transfer device axis, the transfer device being configured to automatically move the microelectronic workpiece to and from the processing station, and wherein the second guide path is transverse to the transfer device axis.

51. (Previously Presented) An apparatus for processing a microelectronic workpiece, comprising:

a processing station configured to releasably receive the microelectronic workpiece;

a support movably positioned proximate to the processing station and being configured to carry the microelectronic workpiece, the support being moveable between a first transferring position and a second transferring position spaced apart from the first transferring position, wherein the support is oriented to receive the microelectronic workpiece from an automatic transfer device when the support is in the first transferring position, and wherein the support is oriented to receive the microelectronic workpiece manually from a user when the support is in the second transferring position, the support being configured to selectively stop its motion at the first and second transferring positions;

an automated transfer device positioned at least proximate to the support to transfer the microelectronic workpiece to and from the support; and

a support surface positioned at least proximate to the processing vessel, the support surface being sized and shaped to removably receive and carry a container of microelectronic workpieces.

52. (Original) The apparatus of claim 51 wherein the processing station includes a vessel configured to provide a processing fluid, and wherein the support is movable to a process position with the support oriented to carry the microelectronic workpiece in contact with the processing fluid when the processing fluid is in the vessel and the support is in the process position.

53. (Original) The apparatus of claim 51, further comprising an enclosure disposed around the processing station, the support and the automated transfer device, and wherein the support surface is positioned external to the enclosure.

54. (Original) The apparatus of claim 51, further comprising:

a support holder carrying the support, the support holder having a guide path, the support being movable along the guide path toward and away from the processing station; and

an enclosure disposed about the processing station, the support and the automated transfer device, wherein the support surface is positioned

external to the enclosure adjacent to a first side of the enclosure, and wherein the support holder is accessible through an aperture in a second side of the enclosure opposite the first side of the enclosure.

55. (Original) The apparatus of claim 51, further comprising a shield positioned proximate to the automated transfer device to at least restrict access of a user to the automated transfer device while the automated transfer device is moving.

56. (Original) The apparatus of claim 51 wherein the processing station is one of a plurality of processing stations and wherein the support is one of a plurality of supports, with each of the plurality of supports being manually accessible to the user for loading and unloading microelectronic workpieces.

57. (Original) An apparatus for processing microelectronic workpieces, comprising:

a plurality of processing stations;

a transfer device positioned proximate to the processing stations and configured to automatically move microelectronic workpieces to and from the processing stations;

an enclosure disposed around at least one of the processing stations, the enclosure having a first surface facing a first direction and a second surface facing opposite the first surface, the first surface having at least one first access aperture, the second surface having at least one second access aperture, the first and second access apertures alone being sized and positioned to allow manual access to the transfer device and all the processing stations.

58. (Original) The apparatus of claim 57 wherein the processing stations are aligned along a generally straight line.

59. (Original) The apparatus of claim 57 wherein the processing stations are aligned along a single, generally straight line.

60. (Original) The apparatus of claim 57 wherein the transfer device is accessible through the at least one first access opening.

61. (Original) The apparatus of claim 57 wherein the enclosure has a third and a fourth surface extending between the first and second surfaces and facing in opposite directions from each other, and wherein the third and fourth surfaces have no apertures sized to allow manual access to the transfer device or the processing stations.

62. (Original) The apparatus of claim 57 wherein the at least one first access aperture includes a first aperture configured to align with a microelectronic workpiece container, the at least one first access aperture being sized to receive at least one microelectronic workpiece and at least a portion of the transfer device.

63. (Original) The apparatus of claim 57 wherein the at least one first access aperture includes a first aperture sized to allow manual access to all the processing stations during manual loading and unloading of a microelectronic workpiece.

64. (Original) The apparatus of claim 57 wherein the at least one first access aperture includes a first aperture sized to allow service access to the transfer device.

65. (Original) The apparatus of claim 57 wherein the at least one first access aperture includes:

one first access aperture configured to align with a microelectronic workpiece container, the one first aperture being sized to receive at least one microelectronic workpiece and at least a portion of the transfer device;

another first access aperture sized to allow manual access to all the processing stations during manual loading and unloading of a microelectronic workpiece; and

another first access aperture sized to allow service access to the transfer device.

66. (Original) The apparatus of claim 57 wherein the at least one second access aperture includes a service aperture positioned to allow access to all the processing stations carried by the chassis.

67. (Original) A microelectronic workpiece processing installation, comprising:
a first region having a first level of cleanliness;
a second region having a second level of cleanliness less than the first level of cleanliness;
a partition between the first and second regions, the partition having at least one opening; and
a tool for processing microelectronic workpieces, the tool being positioned at least proximate to the opening and including:
a plurality of processing stations;
a transfer device positioned proximate to the processing stations and configured to automatically move microelectronic workpieces to and from the processing stations; and
an enclosure disposed around at least one of the processing stations, the enclosure having a first surface facing a first direction and a second surface facing opposite the first surface, the first surface having at least one first access aperture, the second surface having at least one second aperture, the first and second apertures alone being sized and positioned to allow manual access to the transfer device and all the processing stations, wherein the at least one first aperture is accessible from the first region and the at least one second aperture is accessible from the second region.

68. (Original) The installation of claim 67 wherein the tool is sealably coupled to the partition.

69. (Original) The installation of claim 67 wherein the enclosure has a third and a fourth surface extending between the first and second surfaces and facing in

opposite directions, and wherein the third and fourth surfaces project into the first region.

70. (Original) The installation of claim 67 wherein the enclosure has a third and a fourth surface extending between the first and second surfaces and facing in opposite directions from each other, and wherein the third and fourth surfaces project into the second region.

71. (Currently Amended) The apparatus-installation of claim 67 wherein the at least one first aperture includes:

one first aperture configured to align with a microelectronic workpiece container, the one first aperture being sized to receive at least one microelectronic workpiece and at least a portion of the transfer device;

another first aperture sized to allow manual access to all the processing stations during manual loading and unloading of a microelectronic workpiece; and

another first aperture sized to allow service access to the transfer device.

72. (Currently Amended) The apparatus-installation of claim 67 wherein the enclosure has a third and a fourth surface extending between the first and second surfaces and facing in opposite directions, and wherein the third and fourth surfaces have no apertures sized to allow manual access to the transfer device or the processing stations.

73-94. (Cancelled)